

## ABSTRACT OF THE DISCLOSURE

Protein logic gates are made from autoregulated fusion proteins comprising an output domain and a plurality of input domains, wherein at least one of the input domains is heterologous to the output domain, and the input domains interact with each other to 5 allosterically and external, ligand-dependently regulate the output domain. The output domain may be constitutively active, and in the absence of the ligand, the input domains interact to inhibit the output domain. The activity of the output domain is user discretionary, and may include activities that are catalytic, label-generative, metabolic-regulative, apoptotic, specific-binding, etc. Multiple input domains can cooperatively regulate the fusion protein in 10 a wide variety of functionalities, including as an OR-gate, an AND-gate, and an AND-NOT-gate. The gates may be incorporated into cells and therein used to modulate cell function.